

# Cleaning Up with Iron Demonstration Worksheet

1. Describe the color and appearance of the methylene blue and indigo carmine solutions before and after mixing with iron powder. What are the colors of the oxidized form and the reduced form of each dye? Why does the original color of the dye solution gradually reappear upon standing?
2. What characteristics of an organic redox indicator allow it to function as a model substrate for the reduction of pollutants using metallic iron?
3. Predict how (a) the “mesh” or grain size of the iron particles and (b) the concentration of a pollutant in contaminated groundwater will affect the performance of a permeable reactive barrier.
4. Chromate compounds are known human carcinogens and a serious environmental concern. Write a balanced chemical equation for the reduction of chromate ions ( $\text{CrO}_4^{2-}$ ) to  $\text{Cr}^{3+}$  using iron metal in an acidic environment (in the presence of  $\text{H}^+$  ions and water).